eMINTS Expansion Project: Implementing college and career ready standards through 21st century classrooms

Project Narrative

Table of Contents

Introduction

Our nation faces an urgent need and unprecedented opportunity for education reform, fueled by the convergence of the Common Core State Standards (CCSS), the ubiquity of technology in students' lives, and the call for students to be better prepared for college and career. First attempts at standards-based reforms focused on important subject area content. These standards, that varied from state to state, did not take into account the demands students face in post-secondary education and the workplace. As a result, many students met state standards and passed state tests but still required remediation when entering college and the workplace. "They may have been proficient, but they were obviously not prepared" (Achieve, Inc., 2009). The CCSS initiative has met this challenge by creating "common, college- and career ready, internationally benchmarked standards" (Achieve, Inc., 2009).

States report significant difficulty in providing professional development (PD), securing CCSS-aligned curricula, preparing for CCSS-aligned assessments, and finding enough resources for implementing the CCSS (Kober & Rentner, 2014). CCSS-related technology integration is also creating implementation issues. CCSS encourage educators to embed technology seamlessly into their instruction (National Governors Association Center for Best Practices & Council of Chief State School Officers, 2010a), and most state assessments are occurring online (Fletcher & Storandt, 2013). In response, schools are investing in technology infrastructure and hardware (Flanigan, 2014). Many districts are pushing for one-to-one implementations driven in large part by mobile technologies (Nagel, 2014).

The eMINTS program has a 15-year history of helping educators meet these challenging demands through PD and support focused on the powerful intersection of technology, standards-based instruction, and research-based teaching practices. We are positioned to help schools tran-

sition to rigorous internationally benchmarked standards and college- and career-ready curriculum to prepare students for successful futures.

Absolute and Competitive Priorities

This project will validate the effectiveness of the eMINTS program for broad adoption. eMINTS staff will prepare and support affiliate trainers in school districts in other states and contexts in a train-the-trainer extension of the program. PD for affiliates will be adapted to a blended environment consisting of online work, virtual meetings, and face-to-face sessions. The intervention will serve 56 middle schools (grade 7) in a cross-section of 28 urban, suburban and rural high poverty districts (at least 40% of students qualifying for free and reduced priced lunch - frpl) in three states, reaching approximately 84 affiliates, 448 teachers and 24,500 students during a five-year period. Our project will increase student academic performance in mathematics and language arts (ELA) while building the problem-solving skills and the academic mindset critical to middle school students as they move into high school and become college and career ready. The project aligns with **Absolute Priority 2 and Competitive Preferences 1 and 2.**

Absolute Priority 2. We address "Implementing Internationally Benchmarked College- and Career-Ready Standards and Assessments." CCSS demand that students be college and career ready, think independently, comprehend as well as critique, value evidence and use technology and media capably (National Governors Association Center for Best Practices & Council of Chief State School Officers, 2010a). **eMINTS, a comprehensive school-based program of PD** for teachers, trainers, and administrators, is based upon constructivist learning theory (Brooks & Brooks, 1999), supports high-quality standards-based lesson design, promotes authentic learning (Herringon, Oliver & Reeves, 2003; Young, 1993), empowers technology-rich learning environments (Duffy & Jonassen, 1992; Herrington & Kervin, 2007; Jonassen, 1998), and builds

community among students and teachers (Johnson & Johnson, 1987; Kohn 1996; Rogoff, 1998). We help schools implement CCSS by providing specific PD in the design of standards-based rigorous lessons. We set the classroom context for college and career training with technology, authentic tasks, problem solving, and positive academic mindset.

Figure 1. eMINTS Instructional Model

Competitive Preference Priority 1. We address "Improving cost-effectiveness and productivity" by significantly reducing eMINTS program costs while continuing to produce the student achievement gains found in previous research conducted in Missouri schools. We will achieve this by developing local capacity to deliver and expand the eMINTS program through affiliate trainers coupled with the use of technology to create a blended model that develops and supports trainers and administrators. An online community of practice will support and connect all participants. Video systems with cloud technologies will be used to replace some face-to-face classroom coaching visits and peer teacher visits with virtual experiences, resulting in lower costs for districts compared to a traditional eMINTS implementation. See p. 11 of this narrative for further discussion and detailed cost comparisons.

Competitive Preference Priority 2. We address "Enabling broad adoption of effective practices" in the context of our train-the-trainer model. We will (a) formalize the eMINTS train-the-trainer program and materials, (b) create an implementation toolkit for districts, (c) evaluate critical components of the eMINTS program to ensure sustainability through a balance of program fidelity and flexibility, (d) create objectives and milestones dedicated to development of

supports needed to scaffold eMINTS, and (e) evaluate the replicability and adaptability of eMINTS for broad adoption. See Addressing Barriers to Distance and Scale (p. 12).

Significance

Promising New Strategies. eMINTS PD is a comprehensive school-based program that changes teacher practice. Most PD programs attempt to improve specific aspects of effective standards-based college and career-ready programs, such as lesson design, data-driven decision making, inquiry, project-based instruction, collaborative learning and technology integration; few, however, incorporate a comprehensive approach to 21st century skill development to the extent that the eMINTS program does (Meyers, Molee, Dhillon & Zhu, 2015). From lesson design to technology integration to classroom atmosphere, eMINTS makes explicit for teachers the skills required to build 21st century classrooms.

Our approach creates the conditions for change in instruction. Instructional time in most schools is still composed primarily of seatwork, teacher-led whole-class instruction, and low-level work consisting of recognition and memorization (Herrington & Kervin, 2007; National Institute of Child Health and Human Development, 2005; Wiggins, 2015). Classroom observations of teachers completing eMINTS PD in a randomized control trial witnessed increased use of inquiry-based instruction (effect size 0.68), higher levels of technology integration (effect size 1.43), and increased practices associated with building a community of learners (effect size 0.49) over control group schools (Meyers et al., 2015). Dr. Jim Henderson, Director of Instructional Technology at Granite School District in Utah, says, "In my 35 years as an educator, eMINTS is the most powerful program for positively impacting teacher practice I have ever seen."

eMINTS Impacts Student Achievement. eMINTS is one of the few programs with data to support the chain of evidence from delivery of a specific PD program to changing teacher

practice and to positive impacts on student achievement (Martin, Strother, Weatherholt, Dechaume, 2008). Rick Gaisford, director of Utah's State Department of Instructional Technology, and Wayne Hartschuh, executive director of Delaware Center for Educational Technology, testified before Congress in 2009 about eMINTS' effectiveness in closing the achievement gaps and increasing student achievement for all groups in their states. Evaluations of Missouri eMINTS classrooms have consistently found that intermediate elementary students significantly outperformed students enrolled in non-eMINTS classrooms on standardized tests. For all subjects, the gap between eMINTS and non-eMINTS students by group (special education status, frpl, and race/ethnicity) was statistically significant and grew over time (Meyers & Brandt, 2015). Collectively, the studies of eMINTS on teacher and student outcomes suggest that the program makes a difference. A recent randomized control trial in rural Missouri middle schools confirmed these results, in mathematics, meeting *What Works Clearinghouse* Standards for Strong Evidence of Effectiveness (Meyers, et al., 2015). We will substantiate these strong results in mathematics and previous promising results in ELA (Meyers & Brandt, 2015) and add an exploratory question further investigating impacts in science.

Potential Replicability. **Project can scale nationwide.** To meet growing demand, we developed a train-the-trainer model in 2009 to certify district trainers to deliver eMINTS PD. Affiliate trainers contextualize PD, address local needs, provide for diverse learners, pace technology expansion, and improve sustainability (Howard, McGee, Schwartz, & Purcell, 2000). Train-the-trainer models have been shown successful when providing teacher PD (Clark and Dede, 2009; Kanaya, Light and Culp, 2015; Panucci, 2007;). Early findings on the eMINTS train-the-trainer program point to strong fidelity outcomes and comparable student achievement gains between PD delivered by affiliate trainers and eMINTS staff trainers (Martin et al., 2008).

Small-scale evaluations of the train-the-trainer model in Alabama, Delaware, and Utah provide insight into the effectiveness of eMINTS in various settings. Evaluators in Utah found that students in eMINTS classrooms consistently had higher proficiency percentages than a comparison group of students in non-eMINTS classrooms. This was also true when controlling outcomes for race/ethnicity, income status, and LEP status (Elder & Greever-Rice, 2007). Similar descriptive results were found in Alabama (in 2011) and Delaware (in 2010), where the percentage of students meeting or exceeding state standards was higher in eMINTS classes than in non-eMINTS classes. For detailed research information, see Appendix C and Appendix D. This project will validate our promising train-the-trainer model with research meeting *What Works Clearinghouse* Standards and open the way for broad adoption of the successful eMINTS program.

eMINTS Has the Capacity to Scale. The eMINTS National Center, a unit at the University of Missouri, was created in partnership with the Missouri Department of Elementary and Secondary Education and the Missouri Department of Higher Education. During the past 15 years, we have refined the eMINTS intervention fidelity measures, program materials, and processes. We have successfully managed more than $27 million in grants and contracts, including a recent $12.5 million i3 research grant that lead to Strong Evidence of Effectiveness. We have successfully implemented supports for standards-based teaching in technology-rich classrooms. These programs have increased student achievement and given us a deep understanding of the challenges teachers and schools face and the support districts need as they implement eMINTS.

Partners Increase Our Capacity. American Institutes for Research (AIR) has 65 years of experience in evaluating education implementations of local education agencies (LEAs), the U.S. Department of Education, many state education agencies, and private sector nonprofit and for-profit entities. Our past partnership with AIR on a successful i3 validation of our traditional

program has been upheld as model collaboration between practitioners and researchers (Kaplan, Terry, & Beglau, 2014).

Our partner LEA, Granite Public Schools (UT), has been part of eMINTS since the 2003-2004 school year. Granite was the first district outside of Missouri to adopt eMINTS and has successfully implemented the eMINTS model in approximately 300 classrooms in 14 elementary schools. Along with Granite Public Schools, Baldwin County Public Schools (AL) and Springdale Public Schools (AR) will serve as mentor districts in their states. Baldwin County has 9 affiliates who have provided eMINTS PD to teachers in their 47 schools. Springdale has 5 certified affiliates who have provided eMINTS PD in 26 school buildings, with 150 teachers receiving eMINTS certification. The three districts have proven leadership implementing the eMINTS model and will provide support to new districts in their states (see Quality of Design p.13) See Appendix G for letters of support. A match commitment from CDW-G strengthens our proposal. All partners will join our project management team and participate in biweekly calls to help plan, implement and evaluate the project.

National Need for Solutions. eMINTS creates classrooms with student-centered, teacher-facilitated learning that increases achievement. Twenty million new college graduates will be needed in the U.S. by the year 2020 (Layton 2012) and our country will fall millions short of this goal (Hunt & Tierney, 2006; The White House, 2014). Despite this demand for college and career-ready students, U.S. national achievement continues to lag behind that of other industrialized nations. Eleven other countries scored higher than the U.S. in the TIMMS mathematics assessment at grade 8, and 12 scored higher in science. U.S. scores have remained unchanged from 2007 to 2011. (Martin, Mullis, Foy, Stanco, 2012; Mullis, Martin, Foy, Arora, 2012). Performance on The Program for International Student Assessment (PISA) was compara-

ble with students in high poverty schools showing the lowest achievement rates (Organization for Economic Cooperation and Development, 2014).

The CCSS initiative was launched as the first large-scale implementation designed to not only change what students should know, but also to fundamentally change how teachers and students interact in the classroom. According to authors of the CCSS Mathematics Standards (2010b), "These Standards are not intended to be new names for old ways of doing business. They are a call to take the next step" (p.5). Many past reforms have changed the organization of classrooms but not the dynamics of teaching (Supovitz & Spillane, 2015).

Transitioning to these college- and career-ready standards will not occur simply with the introduction of new materials or adaptive computer technologies that are most successful at helping students master factual content (Murphy et al., 2014). Creating the next generation of learners and workers calls for a transformation in the way teachers teach and students learn. The eMINTS program guides teachers through the design and implementation of standards-based lessons that embed technology and authentic learning experiences to transform classrooms into highly engaging, student-centered learning communities. eMINTS classrooms are technology-rich environments where students tackle authentic, real-world problems, collaborate with others, and become savvy consumers of information and producers of new knowledge (Herrington & Kervin, 2007). Authentic learning opportunities that involve students in inquiry and meaningful problems increase choice and autonomy (Toshalis & Nakkula, 2012), cognitive engagement (Marks, 2000) and, in turn, achievement (Newman 1992; Newman, Marks & Gamoran, 1996). Teaching is moved from textbook-driven, lecture-based instruction to practices where teachers facilitate rather than lecture and students are active participants in their learning (Freeman et al., 2014; Michael, 2006). Achievement data and formative assessments inform instructional deci-

sion-making (Black & William, 1998). eMINTS PD creates highly effective teachers who use standards-based lessons helping students achieve in both academics and the "more" this modern world demands.

eMINTS Can Improve Teacher Practice in Implementing Standards. Studies indicate the teacher is the most important factor in determining student success (Schweingruber, Duschl & Shouse, 2007; Hill, Rowan & Ball, 2005). Emerging evidence suggests teachers are challenged to provide engaging learning experiences to help students participate effectively in complex, higher-order thinking tasks derived from the CCSS (Kane & Staiger, 2012). This is especially true in schools with large numbers of high needs students who tend to have the least qualified teachers (Goldring, Gray & Bitterman, 2013). Despite years of implementing standards-based accountability systems, many teachers are still unprepared to use standards-based instructional strategies and to inform those strategies using student assessments (Drake, 2007). Most standards-based instruction necessitates the application of a new skill set; the challenge is not in the standards themselves, but teachers' ability to work with them. Most states and schools have put in place data management systems. Schools and teachers have amassed assessment and benchmark data on a large scale. They know where students are low and where they excel. Schools know that data can inform practice and increase achievement; the problem is that many educators are not effective in leveraging data information for instructional decision-making (Hamilton, et al., 2009; Datnow, Park, & Wohlstetter, 2007).

Strategy to Scale

Unmet Demand for eMINTS. CCSS, the availability of student data, and the ubiquity of technology provide opportunities for schools to increase student achievement and prepare students for college and modern careers. However, teachers have been mostly unsupported in transi-

tioning to instruction that successfully integrates these components. States are currently implementing CCSS and student assessments were administered in 2015, yet superintendents in a nationally represented sample in 43 states reported that fully 50% of districts had not completed key activities in teacher preparation and curriculum as late as February of 2014. Ninety percent of these districts believe the standards are more rigorous than previous state standards, and while over 85% believe the adoption of CCSS will require a fundamental change in instruction, a full 46% identify providing teacher PD as a major challenge to implementation and 67% lack adequate resources to be fully prepared. (Kober & Rentner, 2014)

CCSS are designed to be common across states. This standardization of learning goals across states provides unprecedented opportunities for sharing of resources, curricula, and PD, yet only 20% or fewer districts are partnering with universities, nonprofit organizations, or districts in other states on CCSS implementation activities. (Kober & Rentner, 2014)

In many cases, CCSS PD is focused primarily on understanding the standards, (Walters, Torres, Smith, and Ford, 2014). There is a national unmet need for quality teacher PD that helps teachers design engaging, student-centered lessons that use assessment data to drive instruction and integrate technology. eMINTS can fill that gap by providing job-embedded PD that leads teachers in interpreting the standards and developing engaging, yet rigorous, curricular materials – strategies used in successful school-level CCSS implementations (Amore, Hoeflich, Pennington, 2015). By establishing online educator communities of practice, our project will further the collaboration between states by establishing online educator communities of practice and a digital space for sharing of model teacher-designed units of study so that teachers, technology leaders and administrators can learn from their neighbor's challenges and successes.

Addressing Barriers to Expansion. **Cost as a barrier to expansion.** Because of federal and state budget cuts in technology spending, a train-the-trainer program is becoming the best viable option for the broad adoption of eMINTS. This project will address the issue of scalability and cost by using a blended train-the-trainer model. We will determine best practices for providing eMINTS trainer PD in fewer contact hours by tightly aligning content to our competencies and using a blended model that will provide cost efficiencies and make the program more sustainable. Grant funds will be used to codify and formalize out-of-state implementations of the eMINTS program and expand existing materials – creating flexible options for affiliate trainers while maintaining program fidelity. Our eight-year history of developing and delivering high-quality online and blended teacher PD through the e-Learning for Educators program will assist in development and delivery of blended PD. This project will advise eMINTS and other train-the-trainer approaches on the most effective practices while pursuing cost efficiencies (Guskey and Yoon, 2009).

A current project in which our personnel deliver eMINTS PD to teachers in 57 rural Missouri districts provides a useful comparison of the differences in cost between the two models (eMINTS staff and affiliate trainers). Start-up costs for both programs include PD fees, classroom technology costs, and eMINTS travel expenses that are usually charged to districts in the first two years. Start-up costs for the Missouri project are estimated at $2,097 per student while start-up costs for this project are estimated at $857.32 per student. PD fees for eMINTS to train one teacher are $12,000. Divided by an average of 24 students per year for two years, the cost per student is $250. PD fees to train one affiliate trainer are $20,000. An affiliate trainer can train 25 teachers every two years. When divided by an estimated 25 students per teacher over two years, the cost per student is reduced to $16.60 per student.

Once affiliate trainers have completed training, the only new costs to expand classrooms are an annual $1,000 materials fee per affiliate trainer and any technology costs incurred by the district. In the past the cost of student devices has been the greatest expense for districts to adopt the program. The recent shift to online standardized testing and new lower-cost technology options mean that technology-rich classrooms are already in place thus lowering start-up costs for schools. See section C of the Budget Narrative for more on cost-effectiveness.

Addressing distance and capacity as barriers to expansion. The ability to meet demands from geographically dispersed partners is a challenge. We have inquiries for PD from districts that cannot be fulfilled due to limitations of our staff capacity. We propose to scale eMINTS through a train-the-trainer program that provides face-to-face modeling of best practices as well as content and collegial sharing in an online environment. A blended model will provide cost efficiencies and make the program more sustainable. We will examine online communities of practice to determine the essential conditions and processes for fostering collegial sharing, sustaining engagement, and growing teacher leaders. We will examine the feasibility of technologies in the emerging field of virtual classroom visits and coaching and peer teacher visits (e.g., video systems, social media such as Skype, and collaborative annotation software).

eMINTS provides extensive training materials and support mechanisms for participating teachers. We will improve existing teacher and trainer materials by creating a variety of online guides aligned to eMINTS teacher competencies and flexible for use in a blended training environment. Trainers will choose from a variety of materials to meet the PD needs of different locations and contexts. Providing easy access to updated digital resources allows us to disseminate best practices, innovative technologies and effective local adaptations as they emerge. Our lead LEAs have implemented and sustained the eMINTS program via affiliate trainers and have expe-

rience in adjusting the program to meet the needs of their trainers and teachers. They will help us capture and formalize best practices of PD and instructional coaching, technology infrastructure, administrative support for teachers, and program sustainability.

Addressing building administration support as a barrier to expansion. Building administrators are key to any sustained reform effort (Detert, Kopel, Maureil & Jenni, 2014; Trail, 2000). Our past experience has shown an involved and collaborative principal leads to a successful and sustained implementation (Tharp, 2006). We have always included administrators in implementation decision-making and provided administrator PD. This project will codify and formalize those processes, creating specific online PD materials districts can use to expand and sustain the program.

Dissemination. eMINTS research results and practices have been published in professional journals (Beglau, 2005), featured in a book chapter (Kaplan, Terry & Beglau, 2014), and included in an ISTE white paper (Beglau, et al., 2011). We are featured in practitioner journals such as *Edutopia* (George Lucas Foundation, 2012) and the Missouri STEM Coalition monthly publication (Chaffin & Terry, 2015). Research results from this project will be submitted to national professional and practitioner journals, and regional and statewide publications. The eMINTS website will feature project milestones, results, and best practices. We will present the results of this project at regional and national conferences where we are regular contributors such as ISTE, AERA, and iNACOL. We will use social media (Facebook, Linkedin, Google+, and Twitter) to promote our projects and disseminate grant findings.

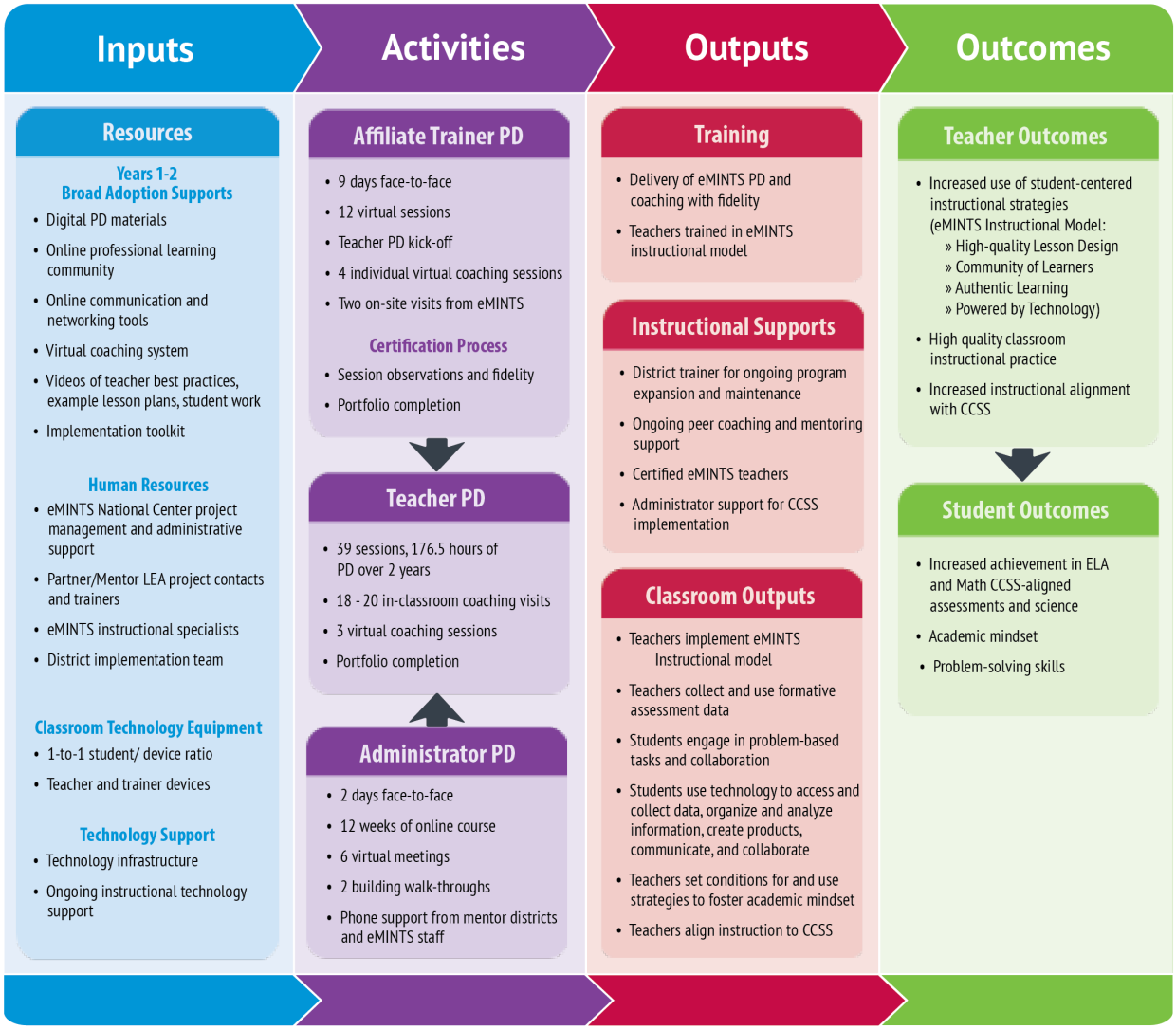
Quality of Project Design and Services

Specific Measurable and Aligned Goals. This project will accomplish three goals:

1) Significantly increase achievement for 7th grade students in ELA, mathematics and science

and improve students' academic mindset and problem-solving skills, 2) Increase the number of teachers who are able to implement internationally benchmarked college and career-ready standards and 3) Formalize, codify and implement a multi-level system of support for strong, scalable, and cost-effective implementation of the eMINTS instructional model. The logic model below details our Project Design.

Figure 2. Logic Model



eMINTS will recruit at least 56 high poverty (at least 40% of students qualifying for frpl) urban, suburban, and rural middle schools with no sanctions or at Level 1 or 2 of School Improvement status. Schools will be recruited from geographically dispersed districts in Alabama Arkansas and Utah. Where feasible, districts will commit at least two matched schools. In the case of small, rural districts, we will recruit matched schools from different districts. All seventh grade subject teachers (ELA, mathematics, science, and social studies) and special education teachers will participate in the study, as well as principals from the schools.

Goal 1: Significantly increase achievement for 7th grade students in ELA, mathematics and science and improve students' academic mindset and problem-solving skills.

The transition to middle school can be a defining moment in a child's academic career. In *The Forgotten Middle* (2008), ACT reports that academic achievement reached by eighth grade is a greater indicator of college and career readiness than anything that happens in high school. Yet students experience significant academic decline when they transfer to middle school (Holas & Huston, 2012; West, 2012) and this is especially true for children from disadvantaged areas (West 2012). Disengagement, low motivation and apathy are major issues after 5th grade (Eccles & Roeser, 2010; Wang & Holcombe, 2010). A focus on 7th grade allows us to reach approximately 24,000 students to prevent an achievement dip at this crucial juncture.

eMINTS positively affects student achievement in these high-needs schools by developing students who are problem-solvers, who ask questions, put forth solutions, and defend points of view with arguments supported by complex text and data. Students learn to delve deeply into content, develop their own questions, communicate their thinking, and take responsibility for their learning. Engaging students in authentic, real-world problems and giving them autonomy over their learning can enhance cognitive engagement (Cordova and Lepper 1996; Deci &

Ryan, 1992; Rotgans & Schmidt, 2011), which in turn leads to increased achievement (Finn, 1993; Newmann 1992). For example, students in one class using the eMINTS instructional model after learning that a young person's lifestyle can put them at risk for heart disease were inspired to create a heart-healthy school. The teacher facilitated a process that helped students turn a complex and somewhat overwhelming problem into an achievable one. Students worked collaboratively to research, analyze potential solutions, and target the best solution. They created and tested prototypes before presenting and defending their solutions to the school board. The board chose an active playground design to inform new construction. This approach is grounded in research in problem-based learning (Hung, Jonassen & Liu, 2008), and can lead to increased retention of content (Dochy, Segers, van den Bossche & Gijbels, 2003), enhanced problem-solving (Hung et al., 2008), higher-order thinking skills (Shepherd, 1998), increased self-direction and lifelong learning (Chrispeels and Martin,1998).

We set conditions that support the four critical components of academic mindset: a feeling of belonging in an academic community, a belief that effort will increase ability and competence, a belief that success is possible and within one's control, and a perception that schoolwork is interesting and relevant (Farrington et al., 2012). The CCSS stress the importance of students having "ample opportunities to take part in a variety of rich, structured conversations as part of a whole class, in small groups and with a partner" (National Governors Association & Council of Chief State School Officers, 2010a). Students who learn in classrooms where decisions are made collaboratively display more creativity and higher-order thinking, thus showing higher levels of achievement (Kohn, 1994, 2006). Students in eMINTS classrooms develop 21st century information skills, becoming savvy travelers of the Internet able to locate and critique information. They use one-to-one devices to organize their thinking, create content for a variety of audiences,

and collaborate with others inside and outside their classroom (Sheng & Fui-Hoon Nah, 2010).

Academic mindset. Students transitioning to middle school become less engaged and motivated by schooling (Rockoff & Lockwood, 2010). An increased academic mindset leads to persistence at complicated tasks and engagement in academic behaviors that lead to achievement (Dweck, Walton, & Cohen, 2014; Farrington et al.). We set the context for promotion of academic mindset by providing challenging but achievable tasks that connect to student lives and interests (Bridgeland, DiJulio & Morison, 2006; Brophy, 2013), autonomy and choice (Stefanou, Perencevich, DiCintio & Turner, 2004; Christenson, Reschly, & Wylie, 2012), opportunities for higher order thinking (Farrington, et al., 2012), collaboration (Johnson & Johnson, 2009; Johnson, Johnson, & Smith, 2007), and active participation (Farrington, et al., 2012, Christenson, et al., 2012). As part of our research design we measure the impact of implementing eMINTS on students' academic mindset.

Goal 2: Increase the number of teachers who are able to implement internationally benchmarked college and career-ready standards by: a) designing effective student-centered authentic learning experiences that specifically address CCSS, b) integrating technology seamlessly to support learning, c) using achievement data and formative assessment data to inform instructional decision-making, and d) creating classroom environments where students are safe to take risks and develop a positive academic mindset.

We will use research-based PD that is intense and sustained to move approximately 448 teachers to this level of quality instruction (Garet, Porter, Desimone, Birman, & Yoon, 2001; Darling-Hammond et al., 2009)**.** Teacher PD, occurring fall 2016 to May 2018, involves a one-day state-wide orientation, 39 sessions for 176.5 hours of PD, 18 to 20 in-class coaching visits, and 3 virtual coaching sessions with their affiliate trainer. During PD sessions, teachers ac-

tively experience the strategies they will transfer into the classroom, use technology in the context of classroom activities (Rogers & Abell, 2008; Rushton, Lotter, & Singer, 2011), and develop materials that will be used in their instruction (Garet et al., 2001). The PD is centered on technology-infused teaching and learning, rather than on a technology tool (Learning Forward, 2011). Collegial interaction during PD sessions encourages teachers to make sense of their learning, interpret their experiences, and share ideas (Mezirow, 1997; Darling-Hammond et al., 2009). See Appendix J for detailed PD schedules, project timeline, and management table.

Teachers learn to effectively implement the CCSS. eMINTS helps teachers translate information about student performance into concrete strategies and actions they can use in the classroom to improve student success. eMINTS-trained teachers break down standards into knowledge, understandings and skills that students must know, understand, and implement to successfully master a standard; identify big understandings and essential questions, (McTighe & Wiggins, 2013); develop formative assessments "for, as, and of" learning (Earl & Katz, 2006); and design authentic tasks to engage students in that learning. Our approach has been successful in a variety of settings using a variety of local and state standards (Meyers & Brandt, 2015; Meyers et al., 2015). We have successfully provided PD for teachers using standards in 11 states.

eMINTS-trained teachers design instruction addressing the major shifts identified for ELA and mathematics standards that require students to closely read and analyze complex informational text, back up claims and inferences with data, analyze and draw evidence from text, put thoughts in writing, marshal both written and oral arguments, apply mathematics to solve real problems, and focus on conceptual understanding and problem solving. eMINTS is well aligned to the CCSS for technology integration and information literacy (National Governors Association & Council of Chief State School Officers, 2010a). See PD schedules in Appendix J.1, p. 2

and J.2 p. 8 for CCSS alignment. We involve 7th grade students and teachers in the core subject areas. Teachers of science and social studies use a breadth of nonfiction text to support CCSS literacy standards identified for social studies and science (National Governors Association & Council of Chief State School Officers, 2010a), integrating skills of reading, writing and problem-solving across curricular areas.

Throughout the program, **technologies support changes in teacher practice** (Lawless & Pellegrino, 2007). eMINTS teachers use digital tools to communicate, collaborate, collect assignments, assess learning and personalize instruction (West, 2011). In 2005, eMINTS PD earned mastery alignment with the International Society for Technology in Education's (ISTE) Technology Standards for Teachers, to date one of only three PD programs to do so. eMINTS classrooms were featured in Edutopia's Schools that Work series (George Lucas Foundation, 2012). We earned recognition as a PD Affiliate of the Partnership for Century Skills in 2009.

Although traditional methods leave teachers to work alone to transfer new learning into their teaching practices, **eMINTS trainers provide in-class mentoring and coaching** to help teachers reflect on their own teaching practice and become self-sustaining decision makers (Smith-Maddox, 1999). Each teacher will receive nine in-class visits each year of the project. Teachers will engage in three virtual coaching sessions, once in the first year and twice in the second. Studies have found combining PD and in-classroom coaching to be effective in changing teacher practice and increasing classroom technology integration (Koh & Neuman, 2009; May, 2000; Swan & Dixon, 2006). ISTE recognizes eMINTS coaching as an effective strategy to improve student outcomes in technology-rich classrooms (Beglau et al., 2011).

Teachers develop a constructivist-based portfolio showing proficiency of the eMINTS competencies (App. J.3, p. 12). The portfolio consists of artifacts such as lesson plans,

video of classroom activities, and student work. Teacher reflection is a major component of the portfolio. (Tucker, Stronge, & Gareis, 2013; Oner & Adadan, 2011). Trainers review the portfolio and coach teachers as they master required components and earn digital badges (Ostashewski & Reid, 2015). Teachers receive certification based upon portfolio scores and 80% attendance at PD sessions.

Goal 3. Formalize, codify and implement a multi-level system of support for strong, scalable, and cost-effective implementation of the eMINTS instructional model. We will use a multi-level support system, including a school-based implementation team to guide the project, affiliates to train and certify teachers on behalf of the center, administrator PD, an online community of practice, and mentor LEAs.

As a means of scaling, eMINTS will use a train-the-trainer program to prepare two affiliate trainers at each treatment school (to ensure stability for the research) and one at each control school. The first year of affiliate trainer PD for treatment schools begins in June 2016 with a kick-off event and ends in May 2018 with a celebration event. It consists of 8 days of face-to-face PD (52 hours), 12 virtual sessions (36 hours), and teacher kickoff planning in 2016 (6.5 hours) and monthly support calls. During PD, trainers develop skills in adult facilitation and coaching. Trainers understand both how the instructional model works in the classroom and how to facilitate eMINTS PD sessions. Affiliate PD is built on the same research-based tenets as teacher PD in which eMINTS trainers model effective strategies. In a just-in-time model, trainers plan together for PD they will implement in the next month, then meet to reflect on practice. This job-embedded approach has been positively rated in district trainer feedback surveys. (App. J.4, p. 13 Affiliate Trainer PD Schedule)

eMINTS staff perform two on-site visits to observe, consult, and collaborate with affili-

ates. Affiliate trainers participate in four virtual coaching sessions with eMINTS staff. Trainers complete a professional portfolio of artifacts and reflections highlighting how their work meets expected trainer competencies (App. J.5, p. 28) earning digital badges. The portfolio, videos, site visits, and a minimum attendance of 80% will determine a trainer's certification.

District Involvement. We work with schools to ensure district stakeholders are represented in all stages of implementation. Implementation teams include an administrator, tech coordinator, affiliate trainer, a teacher representative, and project point of contact. We will create a toolkit to support implementation teams, including a needs assessment, technology supports, parent materials, and tools for goal setting, benchmarking, and building walk-throughs. In April 2016, implementation teams will meet in each state to discuss teacher selection, purchasing details, and data collection. Implementation teams will meet virtually with eMINTS staff monthly. In the second year, the teams will make plans for program sustainability and expansion with district leaders, and will disseminate results. District celebration events will be held in April 2018 to share best practices and distribute participant certifications.

Administrators. School principals participate in implementation teams, PD, site visits and phone support from eMINTS staff. PD includes annual face-to-face meetings, a 6-week (2 hours/week) online course in Year 1 and a 6-week online course in Year 2, three virtual meetings (webinars) per year that support online coursework, and an annual building walkthrough. Administrators learn about the eMINTS competencies and how to supervise and support teachers' instructional performance assuming the role of instructional leader in standards reform. They learn to remove barriers for teachers, work with stakeholders, and connect with administrators in other districts to share best practices. We coach administrators in the class walkthrough process (Cervone & Martinez-Miller, 2007; Ginsberg & Murphy, 2002), integrating eMINTS classroom look-

fors with their current teacher evaluation systems. Principals will participate in an online community of practice with other eMINTS districts and mentor LEAs.

Online community of practice as support for trainers, teachers and administrators. Our community of practice (CoP) is designed to: 1) happen naturally, 2) support sociability and participation, 3) attract diverse membership, 4) provide for different roles, 5) use appropriate technology, and 6) use a blended approach (Lai, et al., 2006). Three participant roles support the CoP: leadership, core members and community members (Fontaine 2001). The community facilitates sharing, discussion, and peer support.

Virtual coaching and peer visits support trainers and teachers. The project will implement virtual coaching at multiple levels: eMINTS staff coaching trainers and trainers coaching teachers. Systems in classrooms will record both trainers delivering PD and teachers delivering lessons. Trainers will upload video to cloud-based software enabling comments at any point in the recording. The video is used as a basis for reflective conversations. The eMINTS coaching model involves teacher reflection and building of self-efficacy rather than an evaluative model where teachers are given direct feedback (Foltos, 2007; Joyce & Showers, 2002). Peer visits, an essential component of the eMINTS program, are difficult to schedule with little assurance of quality interactions. Peer teachers at our mentor LEAs will use video to capture quality instruction at their convenience and use the virtual system for collaborative lesson discussions.

Mentor LEAs support schools and ensure a successful implementation. Our mentor LEAs will: a) assist with recruitment, b) mentor both trainers and administrators, c) provide model classrooms, d) act as consultants, e) coordinate state events, f) assist with data collection, g) disseminate project findings, and h) advocate for the program at a state level.

Management Plan. Appendix J includes a **detailed project management timeline** (J.6

p. 30), schedules for the eMINTS train-the-trainer (J.4 p. 13) and teacher PD programs (J.1 p. 2; J.2, P. 8). The management plan addresses five key objectives: 1) prepare for a successful project study, 2) create an effective system for data collection and analyses, 3) prepare LEAs and schools for successful project implementation, 4) implement intervention programs with high fidelity, and 5) complete internal evaluation and program revision, disseminate project information and file timely reports. Listed under each objective are the major activities with begin and end dates and the persons responsible for completing the activities. The 42-month timeline illustrates the activities and milestones and the longitudinal nature of the study (App. J.6 p. 30).

From January to fall 2016, we will complete nine activities for preparing a successful project study, have the measures and systems in place for collecting and analyzing project data, and complete seven major activities for preparing participant LEAs and buildings for the intervention. The milestones accomplished relate to project instrumentation, site recruitment and preparation, development of online communities and training for baseline data.

From fall 2016 to fall 2018, we will implement the intervention programs with fidelity, collect and analyze data, disseminate project information, and complete reports. Affiliate trainers begin their train-the-trainer intervention in spring 2016 and begin delivering the program to teachers in fall 2016. Both are extensive, two-year programs that will continue through spring 2018. Control group schools continue business as usual.

In Year 3 researchers continue data collection and eMINTS staff continue to support districts. Meanwhile, eMINTS improves and codifies materials and practices for with information from formative assessments taken during the project. We will also collect video and stories of best practices for dissemination. In summer 2019, control schools will begin their implementation, finishing teacher PD in May 2021, after the grant end date. Funds included in the Year 5

budget cover the cost of extended PD. Final data analysis and reporting occur in Years 4-5.

Clarity and Coherence of Model to Operate in Three States. The combination of a well-planned two-year implementation, intense and sustained PD resulting in trainer and teacher certification, and the innovative use of technology allows us to develop a system scalable in both scope and cost-effectiveness at the national level. Our plan establishes state- and district-level supports that lead to success. Our prior experiences help us use a balance of face-to-face PD, that provides necessary modeling, and virtual PD, that is more cost effective to develop effective trainers. These trainers work in their districts to transform the ways teachers teach and students learn, meeting a national need for students who succeed academically, are college and career ready, and who can compete in a global economy.

Procedures for Feedback and Continuous Improvement. We use a formal system for internal review and continuous improvement of program processes and PD materials. We collect biannual survey data from affiliate trainers, teachers, and administrators and hold yearly focus group meetings to collect feedback. In Year 3, while evaluators complete data collection, we will analyze feedback data, codify processes and improve materials so that we are poised to scale in different locations and contexts.

Project Evaluation

The evaluation will examine the impact and implementation of the eMINTS blended train-the-trainer professional development program. Participating schools from Alabama, Utah, and Arkansas will be randomly assigned to either (1) receive the eMINTS professional development program or (2) conduct business as usual during the study (control condition) and later receive the program after the evaluation period (see Table 1). The study will assess program impacts on seventh-grade student achievement, student noncognitive skills, and teacher practices by

comparing outcomes between treatment and control schools. Interim outcomes will be examined in first and second years of eMINTS professional development implementation, but summative findings will focus on impacts in Year 3—one year after teachers complete the two-year program—to capture longer-term impacts that may not be evident immediately after the intervention period. The study's statistical power was designed to allow for five percent attrition over time. The analysis samples will consist of successive cohorts of seventh-grade students taught by eMINTS and control teachers. In addition, program implementation fidelity and cost effectiveness will be examined among the treatment schools.

Table 1. Evaluation Timeline

	Before Evaluation	Evaluation			After Evaluation	
	Year 0: Jan.–July 2016	**Year 1: 2016–2017**	**Year 2: 2017–2018**	**Year 3: 2018–2019**	**Year 4: 2019–2020**	**Year 5: July–Dec 2020**
District affiliate trainers	April–July: blended training	First year blended training	Second year blended training	—	First year blended training[a]	Second year blended training
eMINTS teachers	—	First year eMINTS PD	First year eMINTS PD	—	—	—
Control teachers	—	—	—	—	First year eMINTS PD	First year eMINTS PD

[a]Additional (new) district affiliate trainers will be trained in Years 4 and 5 to deliver eMINTS professional development (PD) to control teachers.

Research Questions

The research questions (RQs) address student outcomes, teacher outcomes hypothesized to support student outcomes, program cost, and fidelity of implementation.

Table 2. Research Questions

▪ ***Impacts on Student Outcomes.***	
RQ1	What is the impact of the eMINTS professional development program on Grade 7 students' academic achievement?
RQ2	What is the impact of the eMINTS professional development program on Grade 7 students' academic mind-set?
RQ3	What is the impact of the eMINTS professional development program on Grade 7 students' problem-solving skills?
▪ ***Impacts on Teacher Practices.***	

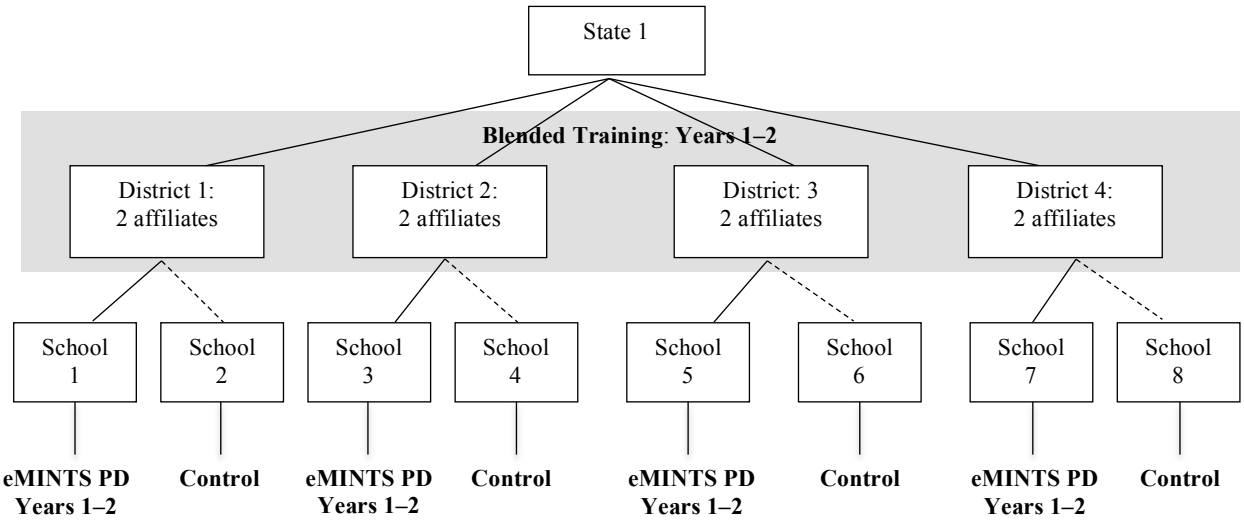
RQ4	What is the impact of the eMINTS professional development program on Grade 7 teachers' use of effective instructional practices in the classroom (high-quality lesson design, authentic learning, classroom community, and technology integration)?
RQ5	What is the impact of the eMINTS professional development program on Grade 7 teachers' instructional alignment with the Common Core State Standards?
Cost Effectiveness and Implementation Fidelity.	
RQ6	How does the cost and burden to schools of delivering the eMINTS professional development program through the blended train-the-trainer model compare with traditional training by eMINTS staff?
RQ7	To what extent do eMINTS trainers deliver the blended train-the-trainer program to affiliate trainers as designed, and to what extent do affiliate trainers participate in the training program?
RQ8	To what extent do affiliate trainers deliver the eMINTS professional development program to teachers as designed, and to what extent do eMINTS teachers participate in the program?
RQ9	To what extent does the blended training program increase affiliate trainers' knowledge and understanding of the eMINTS Comprehensive Program?

Well-Designed Experimental Study

To validate the effectiveness of eMINTS professional development delivered through a blended model, schools will be randomly assigned to either the treatment condition (receive eMINTS professional development in Years 1 and 2) or the control condition (receive eMINTS professional development in Years 4 and 5; see Table 1). The treatment and control conditions will be maintained through Year 3 to allow for follow-up examination of program impacts on eMINTS and control teachers and their seventh grade students in Year 3 after two years of implementation (Figure 1). The design is a multisite, cluster-randomized experiment: schools (clusters) are randomized within districts or, in the case of districts with only one participating school, within blocks of similar districts (sites) to eMINTS professional development or control. This randomization scheme allows an equitable distribution of eMINTS professional development across districts. Blocking by district has the potential benefit of increased power to detect impacts by taking into account geographic and policy differences across districts. In each district, at least two affiliate trainers will participate in the blended training beginning in April 2016 and continue through the 2017–18 school year. The affiliate trainers will start delivering eMINTS professional development to teachers in the treatment schools in 2016–17 (evaluation Year 1)

and continue through 2017–18 (evaluation Year 2).

Figure 3. Allocation of eMINTS Professional Development Program



Note. Treatment and control conditions will be maintained through Year 3. Broken lines highlight the fact that because control schools do not receive eMINTS professional development (PD) until after Year 3, no direct connection exists between them and the blended training implemented at the district level in Years 1–2.

Sample. Participating schools will be schools that enroll seventh graders from geographically dispersed districts across three states. At least 40 percent of the students will be eligible for free or reduced-price lunch, and the schools will not have sanctions or be at Level 1 or 2 of school improvement status as defined in each of the three states. Three districts with six eligible schools in three states have already submitted letters of interest for the project.

The proposed study was designed to meet *What Works Clearinghouse* evidence standards without reservations and statistical power requirements. A power analysis has estimated that 26 districts with two schools each (i.e., 52 schools) will be needed to detect an effect size of at least 0.20 for four confirmatory student outcomes: student **mathematics performance, English language arts performance, academic mindset and problem-solving skills** (See App. J for details.) Fifty-six schools from approximately 28 districts (with an average of 2 schools each) will participate in the study, which allows 5% school-level attrition to meet estimated power. The tar-

get sample of students for RQ1 will include all Grade 7 students in eMINTS and control schools with available assessment data in each year of the evaluation, estimated to include approximately 9,100 students per year (175 students per school x 52 schools, after attrition). AIR will survey students for whom consent is obtained from this target sample to address RQ2 and RQ3.

AIR will survey Grade 7 teachers in treatment and control schools for RQ4 and RQ5, with an estimated sample of 416 teachers per year (8 teachers per school x 52 schools, after attrition) and power to detect an effect size of 0.25 (Appendix J). A random subsample of teachers (2 per school or 104 teachers, after attrition) will be recruited for classroom observations, one measure under RQ4, with power to detect an effect size of 0.42.

Data Collection. AIR will work with each state's department of education and the study districts to collect annual student achievement data and will administer a student survey each spring in Years 1, 2 and, 3 to measure students' mindset and problem solving skills. Teacher outcomes (high-quality lesson design, authentic learning, classroom community, technology integration, and instructional alignment with the Common Core State Standards) will be collected each spring through teacher surveys and classroom observations in Years 1, 2 and, 3 (Table 2). A teacher survey will also be administered in the spring of 2016 to collect pretest data for teacher outcomes

Table 3. Data Collection Timeline for Teacher and Student Outcomes

Outcomes	**2016**		**2017**		**2018**		**2019**		**2020**	
	Spr	**Fall**	**Spr**	**Fall**	**Spr**	**Fall**	**Spr**	**Fall**	**Spr**	**Fall**
		eMINTS Treatment →								
						eMINTS Control →				
Students										
State assessments				X		X		X		
Student survey			X		X		X			
Teachers										
Teacher survey	X		X		X		X			
Classroom observations			X		X		X			
Surveys of Enacted Curriculum (SEC)			X		X		X			

Student outcome measures. For RQ1, AIR will use students' scores in mathematics and ELA from states' Common Core–aligned assessments as the outcome measures. Students' raw scores will be transformed into *z*-scores separately by subject and state (using seventh grade statewide mean and standard deviation). For RQ2 and RQ3, AIR will administer surveys of academic mind-set and problem-solving skills, drawing from validated instruments—the Academic Mind-set (Blackwell, Trzesniewski, & Dweck, 2007; Dweck, 1999), Problem Solving, and Logical Reasoning (Poynton, Carlson, Matt, Hopper, & Carey, 2006) instruments—and AIR's surveys of deeper learning, including constructs for interest and engagement in learning, preference for academic challenge and mastery, and the ability to think of original ideas and solutions (Zeiser, Taylor, Rickles, Garet, & Segeritz, 2014). Exploratory analyses will examine impacts in science (using test scores transformed into z-scores separately by state), and whether the impacts across the three subjects vary by student subgroups or school geographic locale across states.

Student Outcomes Analysis. The analysis of student outcomes (RQ1 to RQ3) will combine samples from the three study states. Because randomization of schools to treatment will be stratified by district, the analysis of student outcomes will employ a three-level model, with students nested within schools blocked by districts (sites). Differences across states will be accounted for by adding state effects as fixed effects at level 3. The models take the following form:

- Level 1 (students): $Y_{ijk} = \pi_{0jk} + \pi_{1jk}X_{ijk} + \pi_{2jk}C_{ijk} + e_{ijk}$
- Level 2 (schools): $\pi_{0jk} = \beta_{00k} + \beta_{01k}T_{jk} + \beta_{02k}S_{jk} + r_{0jk}$, $\pi_{1jk} = \beta_{10k}$, $\pi_{2jk} = \beta_{20k}$
- Level 3 (districts): $\beta_{00k} = \gamma_{000} + \gamma_{001}D_k + \sum_m ST_m + u_{00k}$, $\beta_{01k} = \gamma_{010} + u_{01k}$,

$$\beta_{02k} = \gamma_{020}, \beta_{10k} = \gamma_{100}, \text{ and } \beta_{20k} = \gamma_{200}$$

where Y_{ijk} is the academic, problem-solving, or academic mind-set outcomes of student *i* in school *j* in district *k; X, C, S,* and *D* are, respectively, a collection of baseline student (e.g., prior test score),

classroom (e.g., teacher experience), school (e.g., school mean achievement), and district (e.g., locale) characteristics; T_{jk} is the treatment indicator (0 if control, and 1 if eMINTS); ST_m are binary indicators for each state; and e_{ijk}, r_{0jk}, u_{00k}, and u_{01k} are random errors. Therefore, γ_{000} is the grand mean achievement, and γ_{010} (the parameter of interest) is the overall impact of eMINTS professional development. To assess the effect of modeling choices on impact findings, sensitivity analysis will be conducted as described in Appendix J.

Similarly, three-level models will be used to address exploratory questions on science performance. To explore variations in impact across subgroups, the model will be augmented with an interaction between the treatment indicator and the subgroup of interest (e.g., free or reduced-price lunch eligibility) across states.

Teacher Outcome Measures. For RQ4, AIR will survey teachers and conduct observations in the treatment and control schools. AIR will use a previously validated survey (Meyers, Molefe, Dhillon, & Zhu, 2015) that measures integration of technology into teaching, pedagogical beliefs, approaches to lesson planning, and instructional practices. Reliabilities of the teacher survey for each domain of instructional practice range between .83 and .94. Observations will be conducted by certified observers using the Classroom Assessment Scoring System Secondary (CLASS-S), which measures classroom interactions in three domains: emotional supports, classroom organization, and instructional supports. CLASS-S scales have been found to be reliable and predictive of student gains for middle and high school professional development (Allen, Pianta, Gregory, Mikami, & Lun, 2011). A supplemental observation protocol developed and validated by AIR measures integration of technology for instructional purposes (Meyers et al., 2015). For RQ5, AIR will administer the Surveys of Enacted Curriculum (SEC) (Blank, Porter, & Smithson, 2001), which provides data on instructional content being taught in the classroom

and cognitive expectations being placed on students when learning this content. Survey responses are mapped against Common Core content standards. SEC will be used to assess the extent to which teachers in the treatment and control groups differentially implement the Common Core.

Teacher Outcomes Analysis. Exploratory impact analysis of teacher outcomes (RQ4 and RQ5) will be conducted on the pooled sample of teachers across subjects and districts, accounting for subject taught plus teacher, school, and district characteristics. A three-level model (teachers within schools within districts) will be used for teacher survey outcomes, and analysis of covariance models (with standard errors corrected for clustering) will be used for classroom observations. All models will incorporate state indicators to account for differences across states.

Implementation Fidelity and Cost Effectiveness

Sample. Fidelity of implementation and cost effectiveness data will be collected from affiliate trainers in each of the 28 districts ($N = 56$), administrators in treatment schools ($N = 28$), and teachers who participate in the eMINTS professional development program ($N = 224$, that is, eight teachers per school in 28 eMINTS schools).

Data Collection. Data will be collected to examine the extent to which district affiliates deliver eMINTS professional development as planned to teachers and administrators. Most of the data included in the implementation study are collected by the eMINTS program and can be used by the research team at minimal cost. The timeline in Table 3 summarizes the data collection plans for measuring implementation fidelity and outcomes of the eMINTS blended professional development training model.

Table 4. Data Collection Timeline for Implementation Study

Fidelity Measures	2016		2017		2018		2019		2020	
	Spr	Fall	Spr	Fall	Spr	Fall	Spr	Fall	Spr	Fall
		eMINTS Treatment →								
						eMINTS Control →				
Teachers										
Teacher attendance records		X	X	X	X	X	X			
Teacher satisfaction surveys		X	X	X	X	X	X			
Teacher unit plans					X		X			
Administrators										
Administrator survey			X		X		X			
District Affiliate Trainers										
Affiliate coaching logs		X	X	X	X	X	X			
Professional development session schedules		X	X	X	X	X	X			
Technology audit		X								

Measures

Fidelity of Implementation. Fidelity data will include records of professional development provided, teacher attendance, teacher satisfaction surveys, teacher unit plans, administrator surveys, and district affiliate coaching logs that document and describe classroom visits. In addition, a technology audit will be administered to schools prior to eMINTS implementation. Although eMINTS uses an 80% on an indexed indicator to determine fidelity of implementation, AIR and eMINTS will work together to develop a threshold for implementation above which full implementation is considered acceptable.

Records of Professional Development Provided, Quality, and Staff Attendance. Records of professional development include the number of modules delivered and the hours of professional development and coaching provided to teachers in the eMINTS blended model for both affiliates and teachers, as well as activities conducted during the professional development sessions. These records will be used to assess the amount of professional development provided against the full amount required for the eMINTS program. The eMINTS program will provide district affiliate attendance and certification information. Teacher satisfaction surveys are administered twice annually as a measure of quality.

Teacher Unit Plans. Teachers are asked to develop a detailed unit plan using the eMINTS standard unit plan process that aligns with the four underlying constructs identified in the eMINTS program (Martin, Strother, Weatherholt, & Dechaume, 2008). External evaluators worked with eMINTS program staff to develop and validate a 21-item scoring rubric that scores each unit plan according to its overall quality (as it reflects elements of the four key constructs) on a three-point scale (high, medium, and low). Interrater reliability on this rubric using Cohen's Kappa values ranged from 0.51 to 0.79 across six trials. Teachers will be asked to submit unit plans at the end of the second and third years of the eMINTS professional development program.

Administrator Survey. An important element of the eMINTS blended professional development model is the support provided to administrators for implementation of the Common Core throughout the school. Administrators participate in implementation teams, site visits, and phone support from eMINTS staff. The survey will ask administrators about their participation in these activities and the perceived utility of these activities to support teachers' implementation of the Common Core. They also will be asked about their role as instructional leaders. The survey will also ask for input on the costs and burden associated with eMINTS professional development compared to other forms of professional development at the school.

District Facilitator Coaching Logs. Another important element of the eMINTS blended professional development model is the nine coaching visits affiliates make to each eMINTS teacher's classroom. Using a predeveloped and validated log instrument (Martin et al., 2008), affiliate trainers will record the length of each visit and how much time was spent on modeling instruction, lesson planning, technology assistance, reflective practice, and problem solving.

Technology Resource Audits. Participating districts will complete a checklist to assess treatment schools' technology infrastructure, technology support capabilities, and access to re-

sources that need to be implemented as part of the eMINTS professional development program.

Cost Effectiveness. To answer RQ9, the research team will use a resource cost model (RCM), a method developed and used extensively by AIR in costing out the delivery of program services in a variety of settings. This methodology will address the resources and corresponding costs necessary to replicate the intervention elsewhere. Calculating the start-up and maintenance costs on a per-participant basis is most helpful in providing information to prospective implementers on how much it will cost to undertake such an endeavor with their own population.

eMINTS Budgets. The research team will obtain cost information from the eMINTS team and review financial records to obtain per unit costs of administering the blended train-the-trainer model in districts and then administering the eMINTS program to teachers compared with traditional delivery.

Fidelity of Implementation Analysis. AIR will used a mixed-methods approach to evaluate fidelity of implementation. To assess both the extent to which eMINTS staff deliver the blended training, affiliates deliver eMINTS professional development, and the extent that affiliates (in the blended training) and teachers (in eMINTS professional development) participate in and receive program components (RQ7 and RQ8), the research team will employ a multistep process. First, an overall program-specific dose level will be calculated by creating indexes that allow researchers to measure the extent to which eMINTS staff/affiliates delivered each core blended/eMINTS professional development component and affiliates and teachers participated in or received these core program components. Second, the indexed values for each individual component will be summed to obtain a total dose level for each individual eMINTS staff/affiliate and affiliate/teacher. Third, the average dose levels and variability in dose level allocated by eMINTS staff/affiliates or received by affiliates/teachers will be reported and assessed against

the specific participation criteria established by the eMINTS National Center.

To examine the extent to which district affiliates understand and participate in the eMINTS program (RQ8), evaluators will calculate the percentage of affiliates who obtain full certification and the mean composite score from the portfolio assessment and formal observations, and percentage of affiliates with 80% attendance, and compare these with standards set by the eMINTS National Center.

Cost Effectiveness. To compare the costs of delivering eMINTS professional development through the blended train-the-trainer model and the traditional approach (RQ9), the average cost of delivery per teacher will be calculated and compared using a two-tailed *t*-test of difference in means. The per district cost of delivering the eMINTS model will be measured using financial records maintained by eMINTS in addition to input from administrator surveys. Administrator perceptions of cost and burden of eMINTS professional development will be analyzed and reported separately from the per-unit-cost analysis described below.

To determine average cost of delivery per teacher, the research team will use RCM, which has its roots in the "ingredients" approach to cost analysis (Levin, 1983; Levin & McEwan, 2001), by modeling the structure and ingredients of services as they are actually provided under the intervention. This approach is a systematic, well-tested procedure for identifying all the comprehensive costs for implementing intervention services, including costs that are routinely not adequately identified in budget or expenditure data, such as contributed (in-kind) resources or those that are shared between the intervention and other operational activities. In this approach, an exhaustive list of resources used for each service provided by the intervention is developed, and the personnel/nonpersonnel resources are quantified and costed out using existing prices (e.g., staff salaries and benefits).

References

Achieve Inc. (2009). *Race to the Top: Accelerating College and Career Readiness in States*. Retrieved from http://www.achieve.org/files/RTTT-StandardsandAssessments.pdf

ACT (2008). The Forgotten Middle: Ensuring that All Students Are on Target for College and Career Readiness before High School. Retrieved from https://www.act.org/research/policymakers/pdf/ForgottenMiddle.pdf

Allen, J., Gregory, A., Mikami, A., Lun, J., Hamre, B., & Pianta, R. (2013). Observations of effective teacher-student interactions in secondary school classrooms: Predicting student achievement with the classroom assessment scoring system--secondary. School Psychology Review, 42(1), 76-97.

Amore, A., Hoeflich, N., Pennington, K. (2015). Teacher Leadership: The Pathway to Common Core Success. Retrieved from https://cdn.americanprogress.org/wp-content/uploads/2015/04/CCTeacherVoiceFinal.pdf

Babione, C. (2010). Rural and small community educator responses to state academic standards. *Rural Educator*, *31*(3), 7.

Beglau, M. (2005). Can Technology Narrow the Black-White Achievement Gap? the eMINTS Instructional Model of Inquiry-Based Teaching, Combined with Multimedia Tools in the Classroom, Improves Test Scores for All Students. *THE Journal (Technological Horizons In Education)*, *32*(12), 13.

Beglau, M., Hare, J. C., Foltos, L., Gann, K., Jobe, H., Knight, J., et al. (2011). *Technology, coaching, and community: Power partners for improved professional development in primary and secondary education.* Washington, DC: International Society for Technology in Education.

Black, P., & Wiliam, D. (1998). Assessment and classroom learning. *Assessment in Education*, *5*(1), 7-74.

Blackwell, L. S., Trzesniewski, K. H., & Dweck, C. S. (2007). Implicit theories of intelligence predict achievement across an adolescent transition: A longitudinal study and an intervention. *Child development*, *78*(1), 246-263.

Brooks, G., & Brooks, M. G. (1999). *In search for understanding: The case for constructivist*

classrooms. Alexandria, VA: Association for Supervision and Curriculum Development.

Cervone, L., & Martinez-Miller, P. (2007, Summer). Classroom walkthroughs as a catalyst for school improvement. *Leadership Compass, 4*(4), 1–4. Retrieved from http://www.naesp.org/resources/2/Leadership_Compass/2007/LC2007v4n4a2.pdf

Chaffin, Carla & Terry, Christie. (2015). *Coding in the Classroom – eMINTS Enhances Educator's Abilities to Connect*. STEM Connect. Retrieved from: https://mostemconnection.wordpress.com/2015/01/27/coding-in-the-classroom-emints-enhances-educators-abilities-to-connect/

Chrispeels, J. H. and Martin, K. J. (1998). Becoming problem-solvers: the case of hree future administrators. *Journal of School Leadership*, 8, 303–331.

Clarke, J., & Dede, C. (2009). Design for scalability: A case study of the River City curriculum. *Journal of Science Education and Technology*, *18*(4), 353-365.

Cordova, D. I., & Lepper, M. R. (1996). Intrinsic motivation and the process of learning: Beneficial effects of contextualization, personalization, and choice.*Journal of educational psychology*, *88*(4), 715.

Darling-Hammond, L., Wei, R. C., Andree, A., Richardson, N., & Orphanos, S. (2009). Professional learning in the learning profession. *Washington, DC: National Staff Development Council*.

Datnow, A., Park, V., & Wohlstetter, P. (2007). Achieving with data: How high-performing school systems use data to improve instruction for elementary students. Retrieved from http://csai-online.org/sites/default/files/resource/imported/AchievingWithData.pdf

Deci, E.L., & Ryan R.M. (1992)The relation of interest to the motivation of behavior: A self-determination theory perspective. In K.A. Renninger, S. Hidi & A. Krapp (Eds.), *The role of interest in learning and development* (pp. 43-70) Hillsdale, NJ: Lawrence Erlbaum Associates.

Detert, J. R., Kopel, M. E. B., Mauriel, J. J., & Jenni, R. W. (2014). Quality Management in US High Schools: Evidence from the Field1, 2. *Jsl Vol 10-N2*,*10*, 158.

Dochy, F., Segers, M., van den Bossche, P., and Gijbels, D. (2003). Effects of problem-based learning: a meta-analysis. *Learning and Instruction*, 13, 533–568.

Dong, N. & Maynard, R. A. (2013). *PowerUp!*: A tool for calculating minimum detectable effect sizes and minimum required sample sizes for experimental and quasiexperimental design studies, *Journal of Research on Educational Effectiveness, 6*(1), 2467.

Drake, S. M. (2007). *Creating standards-based integrated curriculum: Aligning curriculum, content, assessment, and instruction.* Thousand Oaks, CA: Corwin Press.

Duffy, T. M., & Jonassen, D. H. (Eds.). (1992). *Constructivism and the technology of instruction: A conversation.* Hillsdale, NJ: Lawrence Erlbaum Associates.

Dweck, C.S. (1999). Self-Theories: Their role in motivation, personality and development. Philadelphia: Taylor and Francis/Psychology Press.

Dweck, C. S., Walton, G. M., & Cohen, G.L. (2014). *Academic Tenacity: Mindsets and Skills that Promote Long-Term Learning.* Bill & Melinda Gates Foundation. Retrieved April 27, 2015, from https://web.stanford.edu/~gwalton/home/Welcome_files/DweckWaltonCohen_2014.pdf

Earl, L., & Katz, S. (2006). Rethinking classroom assessment with purpose in mind. *Winnipeg, Manitoba: Western Northern Canadian Protocol*.

Eccles, J. S., & Roeser, R. W. (2010). An ecological view of schools and development. In J. L. Meece & J. S. Eccles (Eds.), Handbook of research on schools, schooling, and human development (pp. 6-22). New York, NY: Routledge.

Elder, B., & Greever-Rice, T. (2007). *eMINTS4Utah: Final report.* Columbia, MO: Office of Social and Economic Data Analysis.

Farrington, C. A., Roderick, M., Allensworth, E., Nagaoka, J., Keyes, T. S., Johnson, D. W., & Beechum, N. O. (2012). *Teaching Adolescents to Become Learners: The Role of Noncognitive Factors in Shaping School Performance--A Critical Literature Review*. Consortium on Chicago School Research. 1313 East 60th Street, Chicago, IL 60637.

Finn, J. D. (1993). School engagement and students at risk. Washington, DC: National Center for Education Statistics.

Flanigan, R. (2014, June 9). Common Core Raises Questions on Future of Ed-Tech Spending. Retrieved July 13, 2015, from http://www.edweek.org/ew/articles/2014/06/11/35ii-commoncore.h33.html

Fletcher, G & Storandt, B. (2013). Implementing Online Assessment: 4 Pathways to Success. Washington, DC: SETDA.

Foltos, L. (2007). Peer coaching: Changing classroom practice and enhancing student achievement. *Utah special educator*, *27*(5), 34-37.

Fontaine, M. (2001). Keeping communities of practice afloat. *Knowledge Management Review*, 4(4), 16-21.

Freeman, S., Eddy, S. L., McDonough, M., Smith, M. K., Okoroafor, N., Jordt, H., & Wenderoth, M. P. (2014). Active learning increases student performance in science, engineering, and mathematics. *Proceedings of the National Academy of Sciences*, *111*(23), 8410-8415.

Garet, M. S., Porter, A. C., Desimone, L., Birman, B. F., & Yoon, K. S. (2001). What makes professional development effective? Results from a national sample of teachers. *American Educational Research Journal, 38*(4), 915–945. Retrieved from http://aer.sagepub.com/content/38/4/915.full.pdf. doi: 10.3102/00028312038004915.

George Lucas Educational Foundation. July 25, 2012. *Investing in Professional Development for Technology and Inquiry-Based Learning.* Edutopia: What Works in Education. Retrieved from http://www.edutopia.org/stw-tech-integration-professional-development-video

Ginsberg, M. B., & Murphy, D. (2002). How walkthroughs open doors. *Educational Leadership,* 34–36.

Goldring, R., Gray, L., & Bitterman, A. (2013). Characteristics of Public and Private Elementary and Secondary School Teachers in the United States: Results from the 2011-12 Schools and Staffing Survey. First Look. NCES 2013-314. *National Center for Education Statistics*.

Guskey, T. R., & Yoon, K. S. (2009). What works in professional development? *Phi Delta Kappan, 90*(7), 495–500. Retrieved from http://www.kappanmagazine.org/content/90/7/495.full.pdf

Hamilton, L., Halverson, R., Jackson, S., Mandinach, E., Supovitz, J., & Wayman, J. (2009). Using student achievement data to support instructional decision making (NCEE 2009-4067). Washington, DC: National Center for Education Evaluation and Regional Assistance, Institute of Education Sciences, U.S. Department of Education. Retrieved from

http://ies.ed.gov/ncee/wwc/publications/practiceguides/.

Hedges, L. & Hedberg, E.C. (2007, August 14). Intraclass correlations for planning group randomized experiments in rural education. *Journal of Research in Rural Education, 22*(10). Available online at: http://jrre.psu.edu/articles/22-10.pdf

Herrington, J. and Kervin, L. (2007) Authentic Learning Supported by Technology: Ten suggestions and cases of integration in classrooms. Educational Media International, 44 (3). pp. 219-236.

Hill, H. C., Rowan, B., & Ball, D. L. (2005). Effects of teachers' mathematical knowledge for teaching on student achievement. *American educational research journal*, *42*(2), 371-406.

Holas, I., & Huston, A. C. (2012). Are middle schools harmful? The role of transition timing, classroom quality and school characteristics. *Journal of youth and adolescence*, *41*(3), 333-345.

Howard, B. C., McGee, S., Schwartz, N., & Purcell, S. (2000). The experience of constructivism: Transforming teacher epistemology. *Journal of Research on Computing in Education, 32*(4), 455–465.

Howley, A., Wood, L., & Hough, B. (2011). Rural elementary school teachers' technology integration. *Journal of Research in Rural Education*, *26*(9), 1-13.

Hung, Woei, David H. Jonassen, and Rude Liu. (2008)."Problem-based learning." *Handbook of research on educational communications and technology,* 3, 485-506.

Hunt J. B., & Tierney T. J. (2006). American higher education: How does it measure up for the 21st century? San Jose, CA: The National Centre for Public Policy and Higher Education.

Johnson, D. W., & Johnson, R. T. (1987). *Learning together and alone: Cooperative, competitive, and individualistic learning*. Prentice-Hall, Inc.

Jonassen, D.H., Carr, C., & Yueh, H.P. (1998). Computers as mindtools for engaging learners in critical thinking. TechTrends, 43(2), 24-32.

Joyce, B., & Showers, B. (2002). Designing training and peer coaching: Our needs for learning. *VA: ASCD*.

Kanaya, Tomoe ; Light, Daniel; & Culp, K. (2005) Factors Influencing Outcomes From A Technology-Focused Professional Development. Program, *Journal of Research on Technology in Education*, 37:3, 313-329, DOI: 10.1080/15391523.2005.10782439.

Kane, T. J., & Staiger, D. O. (2012). *Gathering feedback for teaching: Combining high-quality observations with student surveys and achievement gains.* Seattle, WA: Bill and Melinda Gates Foundation. Retrieved from http://www.metproject.org/downloads/MET_Gathering_Feedback_Research_Paper.pdf

Kaplan, L. K.; Terry, C. E; Beglau, M. B. (2014). *The eMINTS Professional Development Program and the Journey Toward Greater Program Fidelity* (pp. 86 - 107). New York, NY: Routledge.

Kober, N., & Rentner, D. S. (2014). *Common Core State Standards in 2014: District' Perceptions, Progress and Challenges.* Center on Education Policy. Retrieved from http://cep-dc.org/publications/index.cfm?selectedYear=2014

Koh, S., & Neuman, S. B. (2009). The impact of professional development in family child care: A practice-based approach. *Early Education and Development, 20*(3), 537–562.

Kohn, A. (1996/2006). Beyond Discipline. Alexandria, VA: Association for Supervision and Curriculum Development.

Lai, K. W., Pratt, K., Anderson, M., & Stigter, J. (2006). Literature review and synthesis: Online communities of practice. *Ministry of Education, New Zealand. Retrieved March*, *4*, 2008.

Lawless, K. A., & Pellegrino, J. W. (2007). Professional development in integrating technology into teaching and learning: Knowns, unknowns, and ways to pursue better questions and answers. *Review of Educational Research. 77*(4), 575. Retrieved from http://rer.sagepub.com/content/77/4/575

Layton, L. (2012). High school graduation rate rises in U.S. The Washington Post. Retrieved from http://www.washingtonpost.com/local/education/high-schoolgraduation-rate-rises-in-us/2012/03/16/gIQAxZ9rLS_story.html

Learning Forward. (2011). *Standards for professional learning.* Dallas, TX: Author. Levin, H. (1983). *Cost-effectiveness: A primer*. Newbury Park, CA: Sage Publications.

Marks, H. M. (2000). Student engagement in instructional activity: Patterns in the elementary, middle, and high school years. *American educational research journal*, *37*(1), 153-184.

Martin, M.O., Mullis, I.V.S., Foy, P., & Stanco, G.M. (2012). *TIMMS 2011 International Results in Science*. Chestnut Hill, MA: TIMSS & PIRLS International Study Center, Boston College.

Martin, W., Strother, S., Weatherholt, T., & Dechaume, M. (2008). *eMINTS program evaluation report: An investigation of program fidelity and its impact on teacher mastery and student achievement*. New York: EDC Center for Children and Technology. Retrieved from http://www.emints.org/wp-content/uploads/2011/07/programeval.pdf

Martin, W., Strother, S., & Reitzes, T. (2009). *eMINTS 2009 Program Evaluation Report: Ana-nalysis of the persistence of program impact on student achievement.* Education Development Corporation: Boston, Massachussets. Available online at: http://www.emints.org/wp-content/uploads/2011/07/programeval2009.pdf

May, M. K. (2000). *Mentoring for technology success.* Paper presented at the annual conference of The National Convention of the Association for Educational Communications and Technology, Denver, CO, October.

McTighe, J., & Wiggins, G. (2013). From Common Core Standards to Curriculum. *The New Hampshire Journal of Education*.

Mezirow, J. (1997). Transformative learning: Theory to practice. *New Directions for Adult and Continuing Education, 1997*(74), 5–12.

Meyers, C., & Brandt, C. (2015). *A summary of external program evaluation findings for the eMINTS (enhancing Missouri's Instructional Networked Teaching Strategies) program from 1999–2015.* Naperville, IL: Learning Point Associates. Retrieved from http://www.emints.org/wp-content/uploads/2015/04/eMINTS-Research-Findings-Summary_updated-04.15.2015.pdf

Meyers, Coby; Molefe, Ayrin; Dhillon,Sonica; & Zhu, Bo. (2015). *The Impact of eMINTS Professional Development on Teacher Instruction and Student Achievement: Year 3 Report,* Naperville, IL: American Institutes of Research. Retrieved from http://www.emints.org/wp-content/uploads/2015/03/151527_eMINTS_Year3_report_FINAL.pdf

Michael, J. (2006). Where's the evidence that active learning works? *Advances in physiology education*, *30*(4), 159-167.

Mullis, I.V.S., Martin, M.O., Foy, P., & Arora, A. (2012). *TIMMS 2011 International Results in Mathematics*. Chestnut Hill, MA: TIMSS & PIRLS International Study Center, Boston College.

Murphy, R., Snow, E., Mislevy, J., Gallagher, L., Krumm, A., & Wei, X. (2014). Blended Learning Report. *Michael & Susan Dell Foundation*.

Nagel, D. (2014, June 11). Spending on Instructional Tech To Reach $19 Billion Within 5 Years THE Journal. Retrieved July 13, 2015, from http://thejournal.com/articles/2014/06/11/spending-on-instructional-tech-to-reach-19-billion-within-5-years.aspx

Newmann, F. M. (Ed.). (1992). Student engagement and achievement in American secondary schools. New York: Teachers College Press.

Newmann, F. M., Marks, H. M., & Gamoran, A. (1996). Authentic pedagogy and student performance. *American Journal of Education*, 280-312.

National Governors Association Center for Best Practices & Council of Chief State School Officers. (2010a). *Common Core State Standards.* Washington D. C.: Authors.

National Governors Association Center for Best Practices & Council of Chief State School Officers. (2010b). *Common Core State Standards for Mathematics.* Washington, DC: Authors.

National Institute of Child Health and Human Development. (2005) *A Day in Third Grade: A large-scale study of classroom quality and teacher and student behavior.* Elementary School Journal, 105 (3), 305–323.

Office of Social and Economic Data Analysis. (2002). *Analysis of 2001 MAP results for eMINTS students*. Columbia, MO: Author.

Office of Social and Economic Data Analysis. (2003a). *Analysis of 2002 MAP results for eMINTS students*. Columbia, MO: Author.

Office of Social and Economic Data Analysis (2003b). *Assessing instructional practices in eMINTS classrooms*. Columbia, MO: Author.

Office of Social and Economic Data Analysis (2003c). *Classroom climate, instructional practices and effective behavior management in eMINTS expansion classrooms*. Columbia, MO:

Author.

Office of Social and Economic Data Analysis. (2004). *Analysis of 2003 MAP results for eMINTS students*. Columbia, MO: Author.

Oner, D., & Adadan, E. (2011). Use of web-based portfolios as tools for reflection in preservice teacher education. *Journal of Teacher Education*, *62*(5), 477-492.

Organization for Economic Cooperation and Development (2014). *PISA 2012 Results in Focus: What 15-year-olds know and what they can do with what they know.* Programme for International Students Assessment (PISA). Retrieved from http://www.oecd.org/pisa/keyfindings/pisa-2012-results-overview.pdf

Ostashewski, N., & Reid, D. (2015). A History and Frameworks of Digital Badges in Education. In *Gamification in Education and Business* (pp. 187-200). Springer International Publishing.

Pancucci, S. (2007). Train the trainer: the bricks in the learning community scaffold of professional development. Int J Hum Soc Sci, 2(1), 14-21.

Rockoff, J. E., & Lockwood, B. B. (2010). Stuck in the Middle. *Education Next*,*10*(4), 68-75.

Rogers, M. A., & Abell, S. K. (2008). The design, enactment, and experience of inquiry-based instruction in undergraduate science education: A case study. *Science Education, 92*(4), 591–607.

Rotgans, Jerome I., and Henk G. Schmidt. "Cognitive engagement in the problem-based learning classroom." *Advances in health sciences education*16.4 (2011): 465-479.

Rushton, G. T., Lotter, C., & Singer, J. (2011). Chemistry teachers' emerging expertise in inquiry teaching: The effect of a professional development model on beliefs and practice. *Journal of Science Teacher Education, 22*(1), 23–52.

Schweingruber, H. A., Duschl, R. A., & Shouse, A. W. (Eds.). (2007). *Taking Science to School:: Learning and Teaching Science in Grades K-8*. National Academies Press.

Sheng, H., Siau, K., & Fui-Hoon Nah, F. (2010). Understanding the values of mobile technology in education: A valued-focused thinking approach. *ACM SIGMIS Database, 41*(2), 25–44. DOI: 10.1145/1795377.1795380.

Shepherd, N. G. (1998). The Probe Method: A Problem-Based Learning Model's Affect on Critical Thinking Skills of Fourth and Fifth Grade Social Studies Students. Ph.D. dissertation. Raleigh, NC: North Carolina State University. (Diss. Abstr. Int., 59, 779A).

Smith-Maddox, R. (1999). An inquiry-based reform effort: Creating the conditions for reculturing and restructuring schools. *Urban Review, 31*(3), 283–304.

Sugar, W. (2005). Instructional technologist as a coach: Impact of a situated professional development program on teachers' technology use. *Journal of Technology and Teacher Education, 13*(4), 547–571.

Supovitz, J. A., & Spillane, J. (2015). *Challenging Standards: Navigating Conflict and Building Capacity in the Era of the Common Core*. Rowman & Littlefield.

Swan, B., & Dixon, J. (2006). The effects of mentor-supported technology professional development on middle school mathematics teachers' attitudes and practice. *Contemporary Issues in Technology and Teacher Education, 6*(1), 67–86.

Tharp, S. (2006). Principals Exhibiting Student-Centered Leadership Correlates with Positive School Climate Indicators in Title I eMINTS Schools and Higher MAP Math Scores in Title I eMINTS Classrooms, Office of Social and Economic Data Analysis. Retrieved from http://www.emints.org/wp-content/uploads/2013/09/student-centeredprincipal.pdf

The White House. (2014). Ready to work: Job-driven training and American opportunity. Retrieved from http://www.whitehouse.gov/sites/default/files/docs/skills_report.pdf

Toshalis, E., & Nakkula, M. J. (2012). Motivation, engagement, and student voice. *The students at the center series*.

Trail, K. (2000). Taking the lead: The role of the principal in school reform.*CSRD Connections*, *1*(4), n4.

Tucker, P., Stronge, J., & Gareis, C. (2013). *Handbook on teacher portfolios for evaluation and professional development*. Routledge.

Walters, K., Scheopner Torres, A., Smith, T., and Ford, J. (2014). *Gearing up to teach the Common Core State Standards for Mathematics in rural Northeast Region schools* (REL 2015– 031). Washington, DC: U.S. Department of Education, Institute of Education Sciences, National Center for Education Evaluation and Regional Assistance, Regional Edu-

cational Laboratory Northeast & Islands. Retrieved from http://ies.ed.gov/ncee/edlabs

Wang, M. T., & Holcombe, R. (2010). Adolescents' perceptions of classroom environment, school engagement, and academic achievement. American Educational Research Journal, 47, 633-662.

West, D. (2011). *Using Technology to Personalize Learning and Assess Students in Real-Time*. Brookings Center for Technology Innovation. http://www.brookings.edu/research/papers/2011/10/06-personalizelearning-west

West, M. R., & Schwerdt., G. (2012). The middle school plunge. Education Next, 12(2), 62-68. Retrieved from http://educationnext.org/files/ednext_20122_west.pdf

Wiggins, G. (2015, April 24). Why do so many HS history teachers lecture so much? Retrieved July 13, 2015, from https://grantwiggins.wordpress.com/2015/04/24/why-do-so-many-hs-history-teachers-lecture-so-much/

Young, M.F. (1993). Instructional design for situated learning. Educational Technology Research and Development, 41(1), 43-58.

Zeiser, K., et al. (2014). Evidence of Deeper Learning Outcomes. American Institutes for Research and The Research Alliance for New York Public Schools: Washington, D.C. Available online at: http://www.air.org/sites/default/files/downloads/report/Report_3_Evidence_of_Deeper_Learning_Outcomes.pdf